

# Integrative Strategies for Understanding Neural and Cognitive Systems (NSF-NCS; NSF 14-611)

## PROGRAM SOLICITATION NSF 14-611



**National Science Foundation**

Directorate for Computer & Information Science & Engineering

Directorate for Education & Human Resources

Directorate for Engineering

Directorate for Social, Behavioral & Economic Sciences

**Letter of Intent Due Date(s) (*required*)** (due by 5 p.m. proposer's local time):

December 10, 2014

INTEGRATIVE FOUNDATIONS

Submit your questions by e-mail to [ncs@nsf.gov](mailto:ncs@nsf.gov)

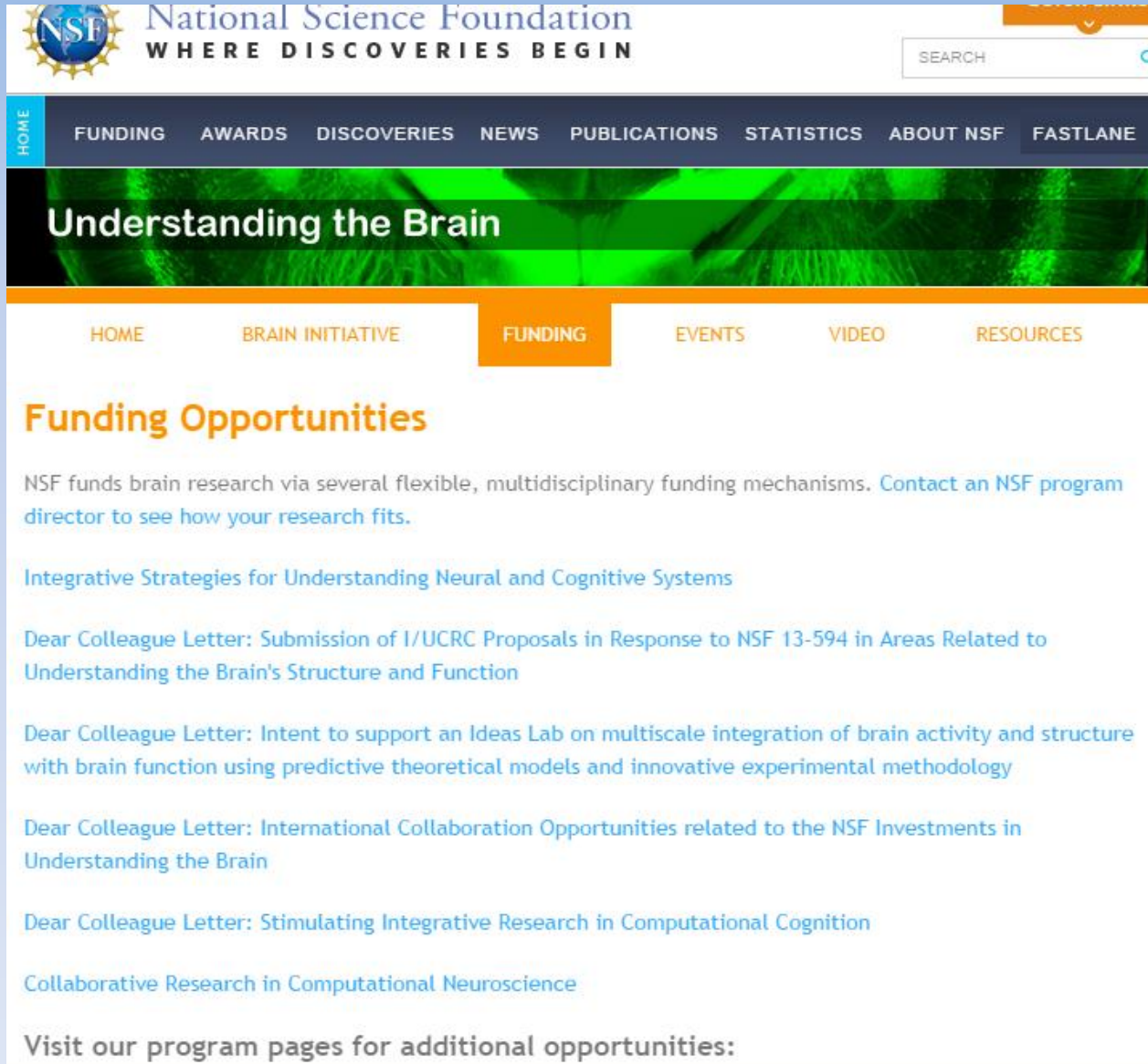
# Integrative Strategies for Understanding Neural and Cognitive Systems

(NSF-NCS; NSF 14-611)

- *program scope and context*
- *themes, proposal classes*
- *how to apply*
- *is this the right opportunity for you?*

<http://www.nsf.gov/ncs/>

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The image is a screenshot of the NSF Brain Initiative website. At the top, the NSF logo is on the left, followed by the text "National Science Foundation WHERE DISCOVERIES BEGIN". To the right is a search bar with the word "SEARCH" and a magnifying glass icon. Below this is a dark navigation bar with links: "HOME", "FUNDING", "AWARDS", "DISCOVERIES", "NEWS", "PUBLICATIONS", "STATISTICS", "ABOUT NSF", and "FASTLANE". The "HOME" link is highlighted in blue. Below the navigation bar is a large banner with a green, textured background and the text "Understanding the Brain". Underneath the banner is a secondary navigation bar with links: "HOME", "BRAIN INITIATIVE", "FUNDING", "EVENTS", "VIDEO", and "RESOURCES". The "FUNDING" link is highlighted in orange. Below this is a section titled "Funding Opportunities" in orange text. The text in this section reads: "NSF funds brain research via several flexible, multidisciplinary funding mechanisms. [Contact an NSF program director to see how your research fits.](#)" followed by a list of links: "Integrative Strategies for Understanding Neural and Cognitive Systems", "Dear Colleague Letter: Submission of I/UCRC Proposals in Response to NSF 13-594 in Areas Related to Understanding the Brain's Structure and Function", "Dear Colleague Letter: Intent to support an Ideas Lab on multiscale integration of brain activity and structure with brain function using predictive theoretical models and innovative experimental methodology", "Dear Colleague Letter: International Collaboration Opportunities related to the NSF Investments in Understanding the Brain", "Dear Colleague Letter: Stimulating Integrative Research in Computational Cognition", and "Collaborative Research in Computational Neuroscience". At the bottom of the section, it says "Visit our program pages for additional opportunities:".

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# Integrative Strategies for Understanding Neural and Cognitive Systems (NSF-NCS)

<http://www.nsf.gov/ncs/>

- ***transformative, integrative, bold, potentially risky; tackle previously intractable challenges***
- bridge temporal/spatial scales, levels of abstraction, levels of analysis, and/or disciplinary and methodological approaches
- first phase of new program
- not business as usual

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**please** read the solicitation  
[nsf.gov/ncs](https://www.nsf.gov/ncs)

**and the NSF Grant Proposal Guide  
(recently revised)**

[nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg)  
[nsf.gov/pubs/policydocs/pappguide/nsf15001/sigchanges.jsp](https://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/sigchanges.jsp)

*“Broader Impacts of the Proposed Work”*

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# “Integrative”

Innovative, **integrative**, boundary-crossing approaches are necessary to push transformative and **integrative** research that will accelerate understanding of novel **integration** of multiple scholarly traditions, experimental methods, and **integrate** across existing disciplines or approaches, spatial or temporal scales, specify how this **integration** occurs within one or more of the research theme **integrative** strategies that will have considerable impact and must transcend **Integrative** strategies are expected to advance scientific frontiers, generate innovative approaches, exploring novel **integration** of expertise and/or tech-**INTEGRATIVE** FOUNDATIONS awards will support projects that develop four- would connect those projects to significant new **integrative** opportunities in sufficient detail to convey the innovative, **integrative** nature of the project must include a concise description that specifically addresses the **Integrative** that will enable cross-institution and/or cross-discipline scientific **integration** **Integrative** Added Value and Transformative Potential \* Does the project articulate a compelling **integrative** vision, build on the state of the art, and develop sound plans for interdisciplinary collaboration and **integrative**

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**Proposals must articulate significantly new, integrative strategies** that will have considerable impact and must transcend the perspectives and approaches typical of individual NSF core programs. All proposals must clearly address how the proposed activity will:

- Extend the boundaries of what is currently possible, with a vision of how important frontiers can be advanced
- Significantly advance existing literature, knowledge, and technologies, or challenge current scientific paradigms
- Bridge temporal/spatial scales, levels of abstraction, levels of analysis, and/or disciplinary and methodological approaches

Potentially groundbreaking approaches that entail significant risk are encouraged. Explicitly address risk and reward.

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## **NSF-NCS 2015 Research Themes**

- *Neuroengineering and Brain-Inspired Concepts and Designs*
- *Individuality and Variation*

## **and Proposal Classes**

- **INTEGRATIVE FOUNDATIONS**
- **CORE+ EXTENSIONS**

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# NSF-NCS 2015 Research Themes

## *Neuroengineering and Brain-Inspired Concepts and Designs*

insights from  
**neuroscience and  
cognitive science** + insights from  
**rapidly changing  
technologies** → significant innovations  
inspired by or directed  
toward the brain

- technologies for imaging, sensing, recording, or affecting real-time brain activity and behavior
- computing paradigms
- brain-computer interfaces
- augmented and adaptive systems (e.g., for communication, learning, performance)
- other computational and bioengineered systems

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# NSF-NCS 2015 Research Themes

## *Individuality and Variation*

characteristic of all neural and cognitive processes:

*biological/machine systems*   *signaling/communication*  
*representations*   *learning/adaptation*   *development*   *resilience*  
*ability*   *cultural/social processes*   *group differences*

- functionally important individuality and variation
- role of noise
- domain-general statistical and modeling challenges
- explore, describe, and understand the role of naturally occurring variability

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# NSF-NCS 2015 Research Themes

***Neuroengineering and Brain-Inspired Concepts and Designs***

***Individuality and Variation***

Within each theme, general advances in theory and methods, technological innovations, educational approaches, enabling research infrastructure, and workforce development are all of significant interest.

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*Subject to availability of funds, anticipated future research themes include:*

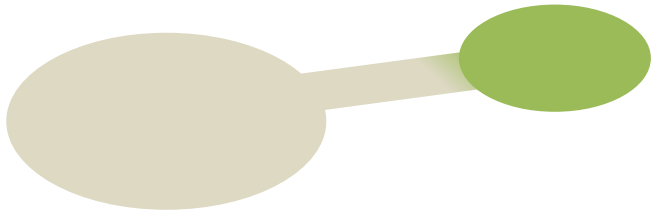
***Cognitive and Neural Processes in Realistic, Complex Environments***

***Data-Intensive Neuroscience and Cognitive Science***

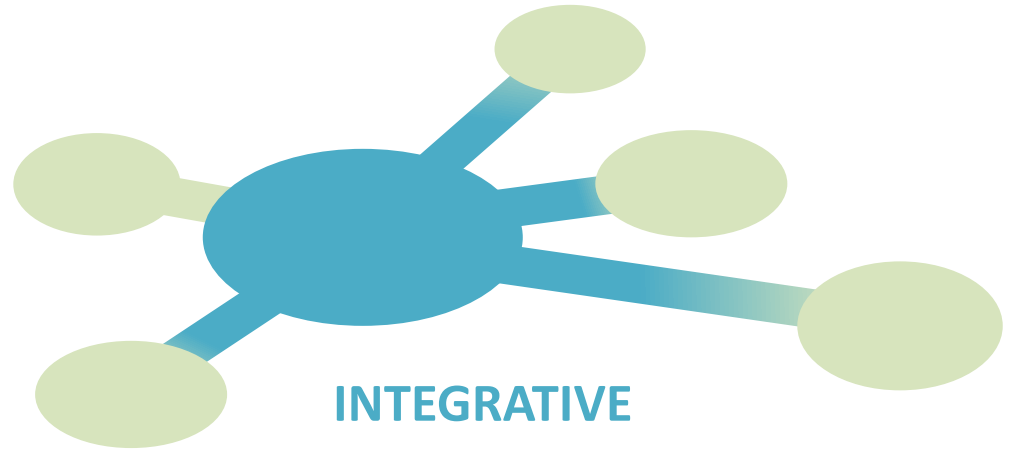
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# NSF-NCS Proposal Classes

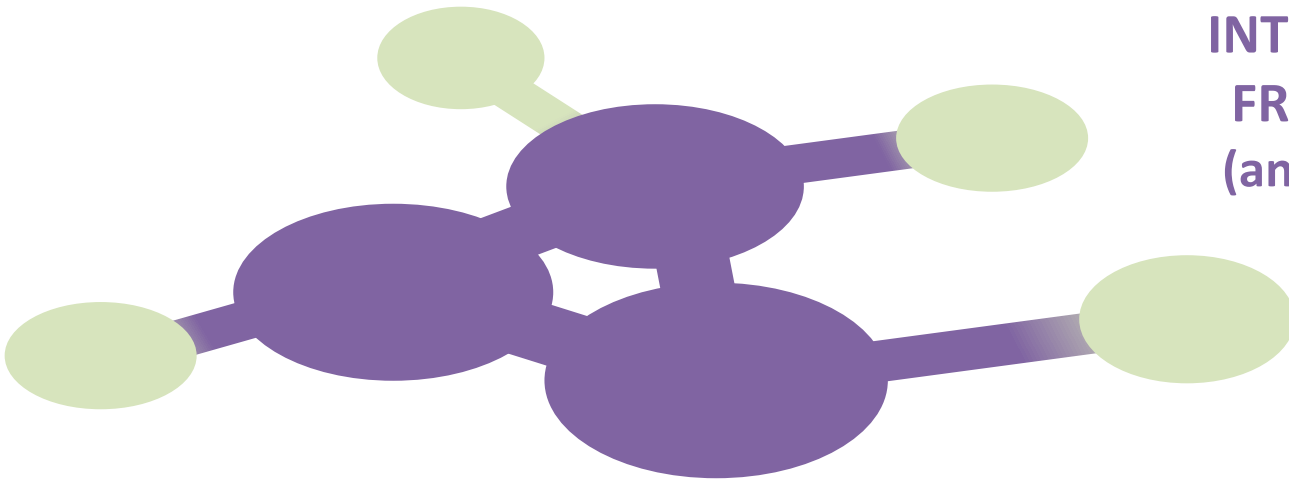
CORE+ EXTENSIONS



INTEGRATIVE  
FOUNDATIONS



INTEGRATIVE  
FRONTIERS  
(anticipated)



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# NSF-NCS Proposal Classes

**Letter of Intent (REQUIRED):**

December 10, 2014

**Proposal Deadline:**

January 26, 2015



- **foundational advances** that are **deeply connected** to a broad scope of questions in cognitive and neural systems
- **transformative advance** in one or more thematic area
- **two or more investigators** with distinct but complementary expertise
- **\$500,000 to \$1,000,000** over 2 to 4 years

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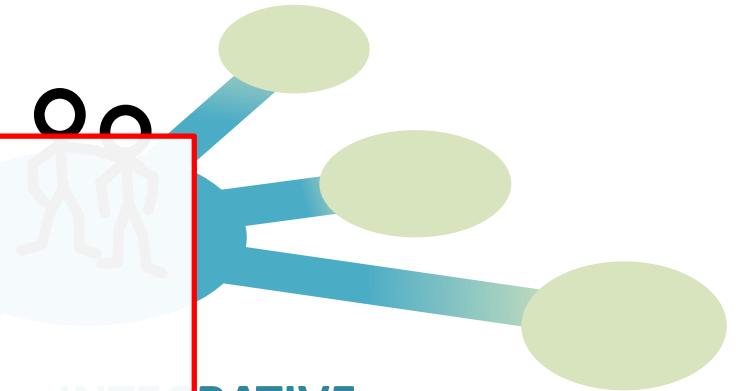
# NSF-NCS Proposal Classes

**Letter of Intent (REQUIRED):**

**December 10, 2014**

**must include on the FastLane form:**

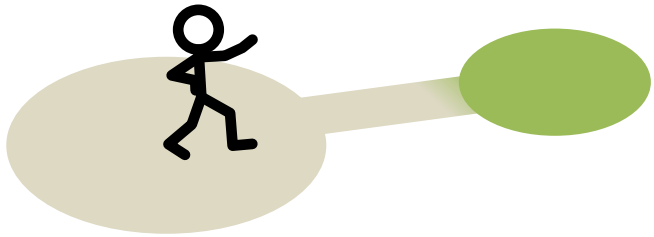
- names and institutional affiliations
- synopsis conveying innovative, integrative nature of the project
- research theme or themes
- participating directorate(s) to which the proposal is relevant (CISE, EHR, ENG, SBE)
- why not suitable for an NSF core program?
- distinct areas of expertise, research approaches, or disciplines represented by the investigators



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# NSF-NCS Proposal Classes

## CORE+ EXTENSIONS



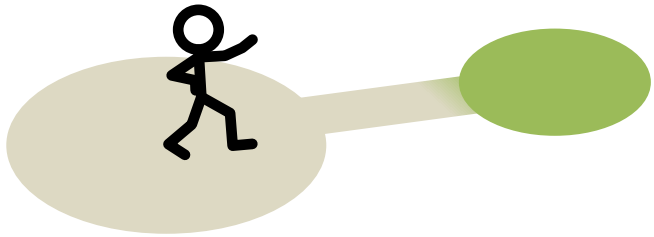
- additional support for projects selected for funding by **other programs in the participating directorates**
- for additional activities that **connect those projects to significant new integrative opportunities** in cognitive and neural systems
- up to **\$100,000** in additional funding

Submit according to dates and requirements of primary program;  
No Letter of Intent

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# NSF-NCS Proposal Classes

## CORE+ EXTENSIONS



## INTEGRATIVE FRONTIERS (anticipated)

**Subject to availability of funds**

- larger ambitious, highly integrative interdisciplinary projects
- three or more investigators
- sustained collaborative effort

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# Merit Review Criteria

**Intellectual Merit**

**Broader Impacts**

**Integrative Added Value and Transformative Potential**

- cross temporal/spatial scales, levels of abstraction, levels of analysis, and/or disciplinary and methodological approaches?
- deep, complementary, synergistic expertise?
- research theme(s) addressed and advanced in significant way?
- bold, potentially risky, well beyond typical disciplinary approach?
- compelling integrative vision, build on the state of the art, sound plans for interdisciplinary collaboration, integrative research?

*(continued...)*

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# Merit Review Criteria

## **Integrative Added Value and Transformative Potential...**

- general advances in theory or methods, or significant technological innovations?
- broadly accessible, high-quality resources that will be useful to the research community at large?
- unique collaborative research experiences for students and early-career researchers?
- interdisciplinary workforce for cognitive science, neuroscience, and/or neuroengineering?

*Applicability and relative weighting of these considerations will vary depending on the nature of the activities being proposed and the proposal class*

## ask yourself

- innovative/integrative?
- address the research theme(s)?
- why not suitable for an NSF core program?
- distinct expertise/approaches/disciplines of investigators?

## also note

- limit one per PI/Co-PI/Senior Personnel
- consistent with the missions of the participating directorates (CISE, EHR, ENG, SBE)
- explicitly address risk and reward

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